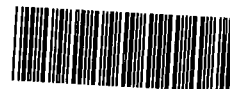




DEPARTMENT OF THE TREASURY
UNITED STATES MINT
WASHINGTON, D.C. 20220

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January 12, 2004



SDMS DocID 2020466

Ms. Carlyn Winter Prisk (3HS11)
U.S. Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

JAN 1 2004

Re: Required Submission of Information
Lower Darby Creek Area Superfund Site
Delaware and Philadelphia Counties, Pennsylvania

Dear Ms. Prisk:

Attached is the additional information submitted by the United States Mint on the above subject in response to questions listed in the Attachment F of your memo of December 16, 2003.

If you have any question and need to contact me, please do not hesitate to contact me at (202) 354-7400.

Sincerely,

Rajkumar Chellaraj
Associate Director - Manufacturing

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RESPONSE TO INFORMATION REQUESTED IN ENCLOSURE F
OF DECEMBER 16, 2003 LETTER FROM EPA REGION III

NOTE: Documents shown in the Attachment A have been used to prepare responses to Questions 1-5. Documents shown in Attachment B have been used to prepare responses to Questions 6-10.

1. Please describe the furnace(s) used by the Mint between 1958 and 1976. Your description should be specific and include but not be limited to the following information:
 - a. The number of furnaces used at one time;
 - b. The general type of furnace used (e.g. annealing);
 - c. The specific type of furnace used (e.g. continuous belt or batch);
 - d. Structural details, including a drawing if available of each type of furnace; and,
 - e. The maintenance and life cycles of the furnace(s).

Response:

No specific information is available to answer questions 1(a) through (e) above.

Lack of availability of information in preparing the responses is due to unavailability of old records. Mint believes that the old records have been handled per the Mint's Directives on Records Management applicable at that time. A sample copy of a current Mint Directive, MD 7B-3, was supplied in the earlier submission.

No specific information is available for the period 1958 to 1968 when the Mint was located at a different location in Philadelphia. Limited information exists on furnaces that were installed at the Mint's current location on Independence Mall in 1968. This information comes from a few project documents (see Attachment A) prepared by the Parson-Jurden Corporation who prepared the design for the new Mint building and process equipment during the period 1965-68. This information has been used to answer Questions 1-5.

Please note that the manufacturing process for coinage used during the period 1968 through 1976 was very different from the process currently used, and that none of the equipment mentioned below (or associated drawings, documentation, etc.) currently exists.

Limited information found in Parson-Jurden Corporation project files give some information on the furnaces used at that time. The information about those furnaces is summarized below.

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Induction Melting Furnaces:

Melting furnaces were used to melt raw material in the form of copper and nickel metal cathodes and zinc slabs. The furnaces were the starting point in the coining process. There were four melting furnaces that operated batch-wise, and could melt a total of approximately 135,000 pounds of metal per 8-hour shift. The furnaces were electric induction type furnaces that rely upon an induced magnetic field to heat the metal feed. The melt from these furnaces was transferred to casting machines that produced ingots that were hot and cold rolled into metal strip used to make the different denomination coins. Ingots composed of three different alloys were produced in the melting and casting operation: copper alloy, copper-nickel alloy, and copper-zinc alloy.

The only information concerning "furnace brick" or refractory materials in the furnaces indicates that the bottom of the melt furnaces were lined with refractory brick, and the induction coils were coated with a thin layer of a product called Inductocoat #31. The purpose of the brick and refractory was to prevent damage to the furnace shell from over heating.

Induction Re-Heat Furnace:

This system included two induction heating units with feed conveyors, hoists, and controls to bring the ingots into the heating coils, heat them to a predetermined temperature, and eject them onto a conveyor serving the hot rolling operation.

Strip Annealing Furnaces (Bell Annealing Furnaces):

The rolling process converted the 6-inch thick ingots into strip with an approximate thickness of 0.1 inch. The metal alloy strip was wound into coils. The strip annealing facility is described as a "bell-type" annealer that had three retorts. The retorts were heated by burning natural gas. Coils were placed in the retorts and heated to a specified temperature. An atmosphere generator was used to create a lean exothermic gas atmosphere in each retort by means of the partial combustion of natural gas. After being held at temperature for approximately one hour, the coils were allowed to cool and removed from the retorts.

2. What is the purpose of the furnace brick described in your response?

Response: See response for Induction Melting Furnaces.

3. From what material(s) was/were the furnace brick used by the Mint during this time period constructed?

Response: No documents are available to prepare the response.

Lack of availability of information in preparing the responses is due to unavailability of old records. Mint personnel believe that the old records have been handled per the Mint's

Directive on Records Management Program, a sample copy of Mint Directive MD 7B-3, which was supplied in the earlier submission.

4. What quantity of furnace brick was disposed each year during the relevant time period?

Response: No information is available.

Lack of availability of information in preparing the responses is due to unavailability of old records. Mint personnel believe that the old records have been handled per the Mint's Directive on Records Management Program, a sample copy of Mint Directive MD 7B-3, which was supplied in the earlier submission.

5. What metals were used at the Mint between 1958 and 1976?

Response: Three ingot alloys were used to make circulating coins during this period.

Ingot Alloy	Composition
Copper	99.9 % Copper
Copper-Nickel	75 % Copper 25 % Nickel
Copper-Zinc	95% Copper 5 % Zinc

NOTE: Responses to Questions 6-10 were prepared by information collected by the Die Manufacturing Department Head by interviewing personnel from Die Manufacturing, who have 30 plus years of service with the Mint (see Attachment B).

6. From what process were die turnings generated?

Response:

- Die turnings were generated in the production of a die blanks. The die blank is roughly a three inch long, round piece of steel cut from a 10-12 foot long piece of bar stock. A coned angle is machined one end of the steel blank. The cone is roughly 0.5 inch in depth. This process was done on a machine called the "Cone-A-Matic" and used an oil based coolant (metal working fluid).
 - Die turnings were also generated using Engine lathes, Tracer lathes and Cut-off lathes. These lathes were used to machine the coinage dies to their final dimensions. There were no coolants used in these machine-turning centers.
7. What materials could have been contained in the turnings?

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Response:

- 52100 tool steel turnings
- W1 tool steel turnings
- "Soluble D" oil based coolant
- "Houghton Grind 60" synthetic coolant. This coolant was used in the final grinding operation.

8. What quantity of die turnings was generated by the Mint each year during the relevant time period?

Response:

During the time period of 1958 - 1976, the Mint would produce roughly a low of 1000 coinage dies per month to a high of 3000 dies per month. Taking an average of 2000 dies per month equals 24,000 dies per year. The average weight of a die slug is 2 pounds and the average weight of a finished die is 1 pound. The difference in weight between a slug and a finished die is the amount of turnings; therefore, roughly 12,000 lbs per year of die turnings were generated.

9. What materials were used to clean and maintain the Mint's dies or other machinery used in the minting of coins?

Response:

Light oils or kerosene was used to wipe down Mint dies and machines in the Die Manufacturing Division.

10. How were the above referenced materials disposed?

Response:

All of the die turnings or grinding slurry were combined with general trash and disposed of in the same manner as trash leaving the Mint.

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ATTACHMENT A

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01/13/04
16:29

PHILADELPHIA MINT
151 N. INDEPENDENCE MALL E.
PHILADELPHIA, PA 19106

**U.S. MINT / PLANT
ENGINEERING
DIVISION**

FAX Number: 215-408-2763

Fax

To: ROGER SWABOP From: DAVE SMALLWOOD
Fax: _____ Date: 1/13/04
Phone: _____ Pages: COVER + 13
Re: _____ CC: _____

☐ Urgent ☒ For Review ☐ Please Comment ☐ Please Reply ☐ Please RecycleTR

Comments:

Copy No. 4

ROGER FA

202-786-6469

PROCESS OPERATING AND
MAINTENANCE MANUAL

U.S. MINT - PHILADELPHIA

PART I of III
PROCESS EQUIPMENT

PREPARED FOR
THE BUREAU OF THE MINT
THE DEPARTMENT OF THE TREASURY

MAY 1969

PARSONS-JURDEN CORPORATION

A WHOLLY OWNED SUBSIDIARY OF THE RALPH M. PARSONS COMPANY
ENGINEERS-CONSTRUCTORS



NEW YORK

ORIGINAL
2 0037CONTENTS

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0004MATERIAL FLOW

Raw material in the form of copper and nickel cathodes and zinc slabs will be delivered to the Mint, by truck, through the truck entrance on Fourth Street. Unloading will be done at the platforms in the trucking area. The area should be set to receive the equivalent of 71 tons of raw material per day.

Approximately 21,260 square feet in the basement and on the first floor have been designated as raw material storage area. Material from the receiving area is to be transported to either basement or first floor storage areas.

The first floor storage area contains cathode shearing equipment for cutting the nickel and copper cathodes into smaller pieces for melting. Cut pieces of nickel and copper are transported to the charge make-up area by belt conveyors and unload in their respective storage bins. Zinc slabs are transported by fork lift truck to the make-up area and sit alongside the platform scale used for weighing gilding metal charges.

Furnace charges are weighed in 3000-pound increments into charge containers which are transported by bridge crane either to the furnace feeders for charging into the furnace or are set in surge storage in the make-up area.

After melting and casting, the cast ingots are automatically ejected from the casting pit onto a transfer conveyor. Ingots may be removed from the transfer table by overhead crane and set into cast-ingot surge storage on the mill floor or continue on into the process.

Cast ingots are conveyed to the end of the transfer table and on to the cropping saw entry table. The shrink end is cropped and the ingot is cut in half. At this point the ingots may be removed from the cropping saw and placed in surge storage on the mill floor or continue on to the reheat furnace entry table. Chips from the cutting operation are delivered in a tote box by overhead crane to the briquetting press. Cropped ingot ends are transported to the make-up area in a tote box by overhead crane for remelting.

Ingots for breakdown rolling are heated to rolling temperature in the induction reheat furnace and are discharged onto the ingot receiving table of the breakdown mill. Nine passes are taken through the mill reducing the thickness of the 6-inch ingot to 0.450 inches. After the last pass through the mill, the rolled ingot passes through the spray cooling chamber where it is cooled to approximately 150° F. The lead end is sheared and the slab passes through the slab milling machine where approximately 0.020 of an inch is milled off the top and bottom surfaces. The material is up-coiled as it leaves the machine. The coil is automatically removed from the up coiler and placed on a storage conveyor. If a second pass through the machine is required, the coil is placed in the coil box at the entry side of the slab miller and the material is sent through the machine again. Coils may be placed in surge storage on the mill floor or transported by overhead crane to the storage conveyor on the rundown mill for further rolling. Sheared slab ends are transported in a tote box to the make-up floor for remelting. Milling machine scrap is collected in tote boxes and transported to the briquetting press.

Coils to be rolled on the rundown mill are passed through the mill five times and are reduced to a thickness of approximately 0.115 inches. After the last pass through the mill the coils are delivered to the coil build-up machine by a gravity conveyor.

At the coil build-up machine the coils are removed from the gravity conveyor and placed on the mandrel of the payoff reel by a coil buggy. On this line five coils are welded together and cracked edges of the strip are trimmed. The material is recoiled, removed from the take-up reel and placed on a saddle conveyor by a coil buggy. Scrap material is collected in tote boxes and removed by overhead crane to the scrap hoppers to be conveyed to the make-up area.

The coil, on the saddle conveyor, is transported to the finishing mill where a coil buggy removes it from the conveyor and places it on the payoff reel mandrel of the mill. After rolling to the required thickness, a coil buggy removes the coil from the take-up reel and places it on a saddle conveyor where it is transported to the slitter and trimmer.

At the slitter and trimmer a coil buggy removes the coil from the conveyor and places it on the payoff reel. On the machine the strip is slit into the required widths and the cracked edges removed. The coil is pushed off on to a down ender which lays the coil on a conveyor. The conveyor moves the coil to north end of the building. A jib crane lifts the coil from the conveyor and places it under the gantry crane for transport to the coining bay. Scrap material is collected in tote boxes and removed by overhead crane to the scrap hoppers to be conveyed to the make-up area.

Material for cents is moved to the bell annealing furnaces by gantry crane where the transfer is made by overhead crane. From bell annealing the strip material is moved, by overhead crane and job crane, to the strip cleaning line. From the strip cleaning line coils are placed on the coin rolling machine by jib crane.

Material for nickels is moved by gantry crane to the coining area and transferred to the overhead crane where it is placed on the coil holder of the blanking press.

Material for cladding is moved to the bell annealing furnaces as for cents. After annealing, coils are moved to the cladding cleaning line by gantry and overhead cranes. After cladding, the coils are moved by overhead and gantry cranes to the finishing mill for final rolling. The material then follows the path used for nickels.

MELTING & CASTING

Since the output of the melting furnaces and casting machines are co-dependent, these two processes will be described in this section.

The melting furnaces must be capable of melting 134,975 pounds of metal per shift and the casting machines capable of casting 132,315 pounds per shift. The distribution by alloy is shown in Table 6-1.

TABLE 6-1

DISTRIBUTION OF MELTING AND CASTING REQUIREMENTS

<u>Alloy</u>	<u>Melting . Pounds per Shift</u>	<u>Casting Pounds per Shift</u>
Gilding Metal	93,935	92,080
Cupro-Nickel - 5¢	23,770	23,300
Cupro-Nickel - Cladding	5,750	5,645
Copper - Cladding	11,520	11,290

The recommended procedure is to melt gilding metal in two furnaces and cast in the two strand machine, melt Cupro-Nickel in one furnace and cast in a single strand machine and melt Copper in one furnace and cast in a single strand machine. The data in Tables 6-2, 6-3 & 6-4 show the procedures for this method of operation.

The following conditions are set forth:

Furnace melting rate is based on information obtained from the furnace vendor for melting two-thirds of the crucible capacity. For the various alloys these are:

Gilding Metal	8,560 pounds per hour
Cupro-Nickel	7,140 pounds per hour
Copper	8,340 pounds per hour

Casting rate from vendor is:

Gilding Metal	7 inches per minute
Cupro-Nickel	6 inches per minute
Copper	7 inches per minute

Turn-around time between casting is taken at 30 minutes, minimum.

Time for charging is taken as 3 minutes.

Cast weights of ingots are:

Gilding Metal	6,630 pounds
Cupro-Nickel	6,700 pounds
Copper	6,720 pounds

First shift in morning starts with full furnace ready for casting.
Last shift at night leaves nearly empty furnace for charging & melting during off shift.

Table 6-5 shows the production capability of the facility.

TABLE 6-5
MELTING & CASTING PRODUCTION CAPABILITY

Alloy	Pounds Melted per Shift	Pounds Cast per Shift	Shifts Required per Year	
			Melt	Cast
Gilding Metal	79,200	76,560	297	301
Cupro-Nickel	35,120	34,800	210	208
Copper	38,720	37,900	75	75

The data shows that even though approximately 51 additional shifts are required to melt & cast gilding metal, these are available from the remaining shifts of the Cupro-Nickel and Copper production. The designed over capacity is approximately 15 percent. The melting equipment is described below.

Furnace Shell

The steel shell provides a rigid container for the shunts, coil and refractory lining. The water-cooled copper induction coil is equipped with connectors which carry both electrical power and circulating water. Flexible, water-cooled leads connect the coil to bus bars and water manifold close to the furnace. The furnace is lined with refractory and is equipped with a leak detector which will shut off power in the event of lining failure.

Laminated iron shunts positioned around the outside of the coil concentrate the magnetic flux near the coil and prevent heating the steel furnace shell. They also provide additional and mechanical strength to the coil by exerting pressure on the outside of the turns. Vibration (due to magnetic forces of the 60 cycle energizing currents) is also effectively damped by presence of the shunts.

The furnace shell is supported on stanchions which permit tilting the furnace through an angle of 95°. Two hydraulic tilt cylinders provide the lifting force.

Furnace Lining

The furnace is shipped with some refractory material installed. The inside of the coil is trowel-coated with a one-fourth inch thick layer of Inductocoat #31 refractory material. The bottom of the furnace is lined with refractory brick. A ring of refractory brick is also emplaced around the top of the furnace just below the cover plate so that the tie rods may be tightened during assembly. This provides additional support and protection for the coil. The remaining portion of the refractory lining is installed at the customer's plant.

Space between the coil and the metal charge affects the degree of magnetic coupling between them. The refractory lining should be as thin as possible to provide maximum coupling, yet thick enough to provide reasonable use-life and a safe, reliable container for the metal charge.

Cure Cycle Timer

When a new furnace lining is installed, drying out of the lining is accomplished by means of furnace heat controlled by the cure-cycle-time. It turns the furnace power on and off so that the gradual furnace temperature rise follows the desired rate of increase.

The cure-cycle-timer is adjustable so that repeating ON and OFF periods may be independently set to provide the correct furnace lining temperature rise during the drying-out period.

Furnace Lid

The steel dome-shaped lid (or cover), lined with refractory material, appreciably reduces heat loss, improves efficiency, reduces time required to melt and to raise temperature, and improves conditions for the operators working near the furnace.

The cover is supported, lifted and pivoted by the cover post assembly which permits raising and swinging the lid aside when access to the furnace is required for charging, temperature checks, inspection and repair. A hydraulic cylinder provides the force required to move the lid.

Power for the Induction Melting Furnace

Power is supplied at line frequency by a power transformer. The correct value of capacitance is connected across the furnace coil so that the combination will be resonant at line frequency.

Because of the coupling between the primary and secondary, changes in the secondary during the melt cycle will be reflected back into the primary. Taps on the power transformer and numerous combinations of capacitance are made available through switching to accommodate these changes. Two electrical properties of the metal charge (inductance and resistance) change in value during the melt cycle.

Since, at the beginning with unheated metal pieces, the metal packing density is low, coupling is poor, and circulating currents through the metal resistance are low, a relatively high voltage tap is required to cause sufficient power to be induced into the load to produce melting temperatures. As the melt cycle progresses and melting takes place, more metal is added, density becomes higher, coupling improves, inductance becomes smaller, and circulating currents through the metal resistance increase in magnitude, increasing the power.

The lower resistance value reflected back into the primary means that increased current will flow in the primary coil and may require use of a lower voltage tap to limit power and current to rated values. Since coupling has increased and secondary inductance has decreased, the lower-valued inductive shunting effect coupled into the primary requires the addition of more capacitance to resonate the circuit.

INDUCTION REHEAT FURNACEGENERAL DESCRIPTION

The induction heating system consists of three feed conveyors, two induction heating units with necessary transfer arms, hydraulic hoist, stops and controls to handle mechanically all the operations necessary to bring slabs into the heating coils, heat them to a predetermined temperature and to eject them onto the breakdown entry conveyor.

Applying a utilization factor of 80 percent to the reheating and hot rolling requirements the equipment must be capable of heating and rolling 154,590 pounds per shift. The distribution by alloy is shown in Table 9-1.

TABLE 9-1DISTRIBUTION OF REHEATING AND HOT ROLLING REQUIREMENTS

<u>Alloy</u>	<u>Pounds per Shift</u>	<u>Number of Ingots per Shift</u>
Gilding Metal	107,910	34.0
Cupro-Nickel - 5¢	26,620	8.4
Cupro-Nickel - Cladding	6,620	2.1
Copper - Cladding	13,240	4.1

Table 9-2 shows reheating data obtained from tests performed at Ajax Magnethermic Corporation.

TABLE 9-2

REHEATING TEST DATA

<u>Alloy</u>	<u>Ingot W't Pounds</u>	<u>Power Input (KWH/T)</u>	<u>Heating Time (Min/Ingot)</u>	<u>Estimated Transfer Time (Min/Ingot)</u>	<u>Total Time (Min/Ingot)</u>
Copper	311	226	11	2	13
Copper	1462	218	17	2	19
Cupro-Nickel	1445	178	10	2	12
Gilding Metal*	--	--	15	2	17

* Estimated from test data on other alloys and electrical properties.

Time for hot rolling is estimated to be approximately 3.5 minutes per ingot, including transfer and screwdown times. Re-heating is the limiting factor.

There is insufficient test data to predict the production performance of the equipment with any degree of certainty; therefore, the estimated heating time, shown in Table 9-3 is based on Ajax test data.

TABLE 9-3

ESTIMATED HEATING TIME

<u>Alloy</u>	<u>Heating Cycle* (Min)</u>	<u>Ingot to be heated Per Shift</u>	<u>Total Time (Min) Shift</u>
Gilding Metal	8.5	34.0	289
Cupro-Nickel	6	10.5	63
Copper	9.5	4.1	39

* Heating cycle time is divided in half because the facility contains two furnaces.

The data in Table 9-3 indicates that the production requirements can be met in 391 minutes of a 480 minute shift. This is an excess capacity of approximately 6.5 percent.

Operating Procedure

Operation may be controlled manually by depressing push buttons for the various steps in sequence, or they may be done automatically. For automatic operation the control is set for "Auto On". The controls first signal the status of the system through panel lights to inform the operator that all components are in readiness for operation. If all is clear, the system then starts operations, going through all steps up to the point of heating. At this point the system waits for the operator to actuate the "Heat Control On" pushbutton which powers the induction coils. The slab is then brought up to temperature, at which point the power is automatically cut off. If the slab is not needed immediately for rolling, it is held in the heater, which will be automatically powered intermittently whenever the slab temperature drops to a set point.

To eject the slab, the rolling mill operator depresses the eject button, which starts the automatic eject cycle to remove the hot slab and deposit it on the discharge conveyor. During this sequence, another ingot, which has been indexed to the receiving position, starts its cycle into the induction heater.

The automatic sequencing may be set to feed slabs into both heaters or into either one individually, for the latter case, the heater not activated is bypassed and slabs are not fed to it.

It is of utmost importance for the operator to see that cooling water is flowing in the induction heating coils. This must be the first step, before starting to feed slabs.

The sheets which follow give detailed steps and indicate the specific control buttons to use for each method of operation.

BELL ANNEALING

The annealing facility is capable of bright annealing the coiled strip for the coin rolling machine at a rate of 10,000 pounds per hour.

- a. The coil is gilding metal which is an alloy composed of 95 percent copper and 5 percent zinc. The strip has been work hardened due to the cold rolling process with 87.5% reduction.
- b. Each coil is tension wound and banded radially and circumferentially. It is 5 inches wide, having an outside diameter of 66 inches and weighs approximately 4,100 pounds.
- c. The banded coils are delivered to and loaded into the furnaces on pallets. The annealing cycle is carried out in groups of ten (10) coils for a maximum charge of 41,000 pounds, exclusive of the weight of the pallets or coil spacers.
- d. The equipment installed is capable of bringing the entire charge to a uniform temperature of $1250^{\circ}\text{F} \pm 10^{\circ}\text{F}$. The charge is held at this annealing temperature for one hour before the cooling operation.

ATMOSPHERE GENERATOR

One (1) combustion type atmosphere generator has been installed to provide a lean exothermic gas atmosphere for use within the furnace retorts. The generator is capable of supplying the required quantity of gas to all six retorts simultaneously.

- a. Control is provided to automatically maintain the air-gas ratio at any set value within the minimum and maximum output capacity of the generator.
- b. A refrigerant type dryer has been installed to cool the atmosphere to approximately 40°F after it leaves the generator.
- c. Protective equipment has been installed to shut off the raw gas supply in the event of gas pressure or power failure. After this type of shut down it is necessary to manually reset the protective equipment before restarting and a restart cannot be accomplished until the fault which caused the shut down has been cleared.

OPERATING PROCEDURE

1. Load the furnace base number 1 with 10 coils, 5 on each of 2 pallets with spacers in between.
2. Place retort over coils and check for proper sealing.
3. Place furnace bell over retort and connect gas and electric.
4. Start heating cycle and check output of atmosphere generator. Set Temperature controller to 1250°F and heat material in approximately 7 hours. Soak at 1250° F \pm 10° for one (1) hour.
5. Remove furnace bell and place on base number 2. Start heating cycle.
6. Place Cooling Hood on base number 1 and connect water and electric. Cool for approximately 16 hours.
7. Unload coils to storage area, re-load and start cycle over.

Refer to Table 16-1 for a suggested schedule of operation.

ATMOSPHERE GENERATOR-START UP

1. Open Vent Valve.
2. Turn main circuit interrupter on.
3. Turn alarm selector switch to off position and compressor selector switch to on position.
4. Start Combustion Air Blower, Water Pump and Gas Sample Blower.
5. Make sure water valves are turned on, open main gas valves.
6. Push ignition start button until green light comes on indicating that a pilot flame has been established.
7. Turn alarm selector switch to on position.
8. Open gas safety shut-off valve.
9. Adjust Air and Gas flo-meters until desired mixture is reached.
10. Close Vent valve. (Recheck Flo-Meter)

P-J 3481-1/2

August 23, 1965

Table 2.2
Standard U. S. Coinage Alloys

Ingot Alloy	Composition	Tolerance
Copper	99.9 Per Cent Copper	Minimum
Cupro-Nickel	75 Per Cent Copper 25 Per Cent Nickel	$\frac{25}{1000}$ On Nickel Content
Copper-Zinc	95 Per Cent Copper 5 Per Cent Zinc	None

ATTACHMENT B

United States Mint-Philadelphia

Die Manufacturing Memorandum

To: Dave Smallwood
Environmental Chemist-U.S. Mint-Philadelphia
From: David Puglia
Die Manufacturing Division Head
Date: January 5, 2004
Re: Information requested for Enclosure F

Dave,

The following answers are in reference to the questions asked regarding the Lower Darby Creek Area Superfund Site. Since the time period precedes my arrival to the Mint, the answers are based on interviewing personnel from Die Mfg who have 30 plus years of service at the Mint.

#6: From what process were die turnings generated?

- Die turnings are generated in the production of a die blank. The die blank is roughly a three inch long, round piece of steel cut from a 10-12 foot long piece of bar stock. A coned angle is machined one end of the steel blank roughly .5" in depth. This process was done on a machine called the "Cone-A-Matic" and used an oil based coolant called soluble "D".
- Die turning were also generated using Engine lathes, Tracer lathes and Cut-off lathes were used to machine the coinage dies to either final dimensions. There were no coolants used in these machine-turning centers.

#7: What materials could have been contained in the turnings?

- 52100 tool steel turnings
- W1 tool steel turnings
- Soluble "D" oil based coolant
- Houghton "grind 60" synthetic coolant. This coolant was used in our final grinding operation.

#8: What quantity of die turnings was generated by the Mint each year during the relevant time period?

- During the time period of 1958 - 1976, the Mint would produce roughly a low of 1000 coinage dies per month to a high of 3000 dies per month. Taking an average of 2000 dies per month equals 24,000 dies per year. The average weight of a die slug is 2 pounds and the average weight of a finished die is 1 pound. The difference in weight between a slug and a finished die is the amount of turnings; therefore, roughly 12,000 lbs per year of die turning were trashed.

#9: What materials were used to clean and maintain the Mint's dies or other machinery used in the minting of coins.

- Light oils or kerosene was used to wipe down machines in the Die Mfg Division.

#10: How were the above referenced materials disposed?

- All of the die turnings or grinding slurry were combined with general trash and disposed of in the general dumpster.